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| EXAMINER | |
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## BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/578,057
Filing Date: March 19, 2007
Appellant(s): SZELES ET AL.

Mark Levy
For Appellant

## EXAMINER'S ANSWER

This is in response to the appeal brief filed 23 June 2010 appealing from the Office action mailed 22 January 2009.

**(1) Real Party in Interest**

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The following is a list of claims that are rejected and pending in the application:

Claims 1-7 are currently pending in this application. Claims 1-7 have been rejected under 35 USC 103.

**(4) Status of Amendments After Final**

The Appellant submitted an after final amendment, which was received 17 July 2010. This amendment raised new issues that would require further search and/or consideration and therefore was not entered.

**(5) Summary of Claimed Subject Matter**

The examiner has no comment on the summary of claimed subject matter contained in the brief.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being

maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is incorrect. Appellant has included in the Appendix the amended claims presented after Final, which were not entered. The Examiner is including the claims currently pending in this application.

**(8) Evidence Relied Upon**

| | | |
|---|---|---|
| 2003/0209184 | Kazandjian et al. | 11-2003 |
| 5,314,651 | Kulwicki | 5-1994 |
| 4,907,043 | Uekita | 3-1990 |

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazandjian et al. (US 2003/0209184), hereinafter referred to Kazandjian, in view of Kulwicki (US 5,314,651) and Uekita et al. (4,907,043), hereinafter referred to as Uekita.

**With respect to claim 1**, Kazandjian teaches a radiation detector made from a compound comprising: $Cd_xZn_{1-x}Te$, where $0 \leq x \leq 1$ (Abstract; [0015]); an element from column III of the periodic table ([0015]) in a concentration about 10 to 10,000 atomic

parts per billion ([0065]); and an additional element in a concentration about 10 to 10,000 atomic parts per billion ([0015] and [0065]).

Kazandjian does not explicitly teach the additional element is a rare earth element selected from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

Kulwicki teaches doping a polycrystalline material with an element from column III of the periodic table and a rare earth element such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, and Er (Abstract; col. 2, lines 2-9). Uekita teaches that examples of polycrystalline material are CdTe and ZnTe and that these materials are usually doped with rare earth elements (col. 2, lines 54-57; col. 3, lines 6-12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try having the additional element, taught by Kazandjian, be a rare earth element such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, and Er, as a person of ordinary skill has good reason to pursue the known options within his/her technical grasp.

**With respect to claims 2-4 and 6**, Kazandjian teaches a method of forming a radiation detector compound comprising:

(a) providing a mixture of Cd, Zn and Te ([0042]);

(b) heating the mixture to a liquid state ([0022] lines 5-6; [0023] lines 2-4; [0042]; [0045]);

(c) adding to the liquid mixture a first dopant ([0043]);

(d) adding to the liquid mixture a second dopant ([0043]); and

(e) solidifying said mixture including said first and second dopants to form the compound (claim 8).

Kazandjian does not explicitly teach that the first dopant adds shallow level donors (electrons) to the top of an energy band gap of said mixture when it is solidified or that the second dopant adds deep level donors and/or acceptors to the middle of said band gap of said mixture when it is solidified.

Kulwicki teaches doping polycrystalline with an element from column III of the periodic table, such as Al, Ga, or In, and a rare earth element, such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, or Er (Abstract). Doping with Al, Ga, or In will add shallow level donors (electrons) to the top of an energy band gap of said mixture when it is solidified. Doping with La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, or Er will add deep level donors and/or acceptors to the middle of said band gap of said mixture when it is solidified.

Uekita teaches that examples of polycrystalline material are CdTe and ZnTe and that these materials are usually doped with rare earth elements (col. 2, lines 54-57; col. 3, lines 6-12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try having the first dopant, taught by Kazandjian, be Al, Ga, or In, taught by Kulwicki, which will add shallow level donors (electrons) to the top of an energy band gap of said mixture when it is solidified and have the second dopant, taught by Kazandjian, be La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, or Er , as taught by Kulwicki, which will add deep level donors and/or acceptors to the middle of said band

gap of said mixture when it is solidified as a person of ordinary skill has good reason to pursue the known options within his/her technical grasp.

**With respect to claims 5 and 7**, Kazandjian further teaches a concentration of the first dopant and of the second dopant in the compound is about 10 to 10,000 atomic parts per billion ([0015] and [0065]).

**(10) Response to Argument**

Appellant states "Appellants welcome the opportunity to amend claim 2 to its original form" (Pg 10, 2nd paragraph appeal brief received 23 June 2010). Claim 2 has not been amended and thus remains in its original form.

Appellant argues that Kulwicki discloses doping polycrystalline with an element from column II and that this is not the same as doping CdZnTe with elements from column VII. Firstly, the claims have been rejected under 35 USC 103 with Kulwicki as a secondary reference. Kazandjian teaches doping CdZnTe with an element from group III of the periodic chart and iron (Abstract). Secondly, doping with an element from column VII is presented in the claims in the alternative to an element from column III. The rejection presented is applied in regards to doping CdZnTe with an element from column III not with an element from column VII.

Appellant states that Kulwicki discloses combining donor elements Nb, TA, Bi, Sb, Y, La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, Er with acceptors such as Co, Cu, Fe, Mn, Ru, Al, Ga, Mg, Sc, K, Na, U, In, Mg, Ni, or Yb and agrees that the acceptor elements are rare earth metals. Appellant argues that the donor elements recited are all from column II of the periodic table and use barium strontium titanate, not CdZnTe, as recited in Appellants' claims.

Appellant first states that Nb, TA, Bi, Sb, Y, La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, Er are donor elements. Then, Appellant states that the acceptor elements are rare earth metals. La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, and Er are rare earth metals. Kulwicki teaches doping a polycrystalline material with both an element from column III of the periodic table, such as with Al, Ga, or In, and a rare earth element, such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, or Er. While Kulwicki does not teach the polycrystalline to be CdZnTe, Kulwicki is not the sole or primary reference. Kazandjian (the primary reference) teaches doping CdZnTe with iron and an element from group III of the periodic table, such as Al, Ga, or In ([0043]; [0048]). Uekita teaches that examples of polycrystalline material are CdTe and ZnTe and that these materials are usually doped with rare earth elements (col. 2, lines 54-57; col. 3, lines 6-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try having the CdZnTe doped with an element from group III of the periodic table, such as Al, Ga, or In, as taught by Kazandjian, be doped with a rare earth element, such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, or Er, as taught by Kulwicki, rather than iron, as a

person of ordinary skill has good reason to pursue the known options within his/her technical grasp.

Appellant argues that Kazandjian and Kulwicki do not disclose or suggest using column VII elements. Doping with an element from column VII is presented in the claims in the alternative to an element from column III. The rejection presented is applied in regards to doping CdZnTe with an element from column III not with an element from column VII.

In response to applicant's arguments against the references individually (For Example Appellant argues that Kazandjian involve only elements from column III of the periodic table and no rare earth elements), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellant argues that Chemistry reactions are very specific to the attributes of each element of the equation and, thus, one of ordinary skill would not find it suggestive to use a compound CdZnTe, combined with rare earth with elements from column III to create the desired reaction. Kazandjian teaches doping CdZnTe with an element from group III, such as Al, Ga, or In ([0043]; [0048]), and a second dopant. Kulwicki teaches doping a polycrystalline material with an element from group III, such as Al, Ga, or In,

and a rare earth element, such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, or Er (Abstract). Uekita teaches that examples of polycrystalline material are CdTe and ZnTe and that these materials are usually doped with rare earth elements (col. 2, lines 54-57; col. 3, lines 6-12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try having the CdZnTe doped with a column III element have the additional dopant element, taught by Kazandjian, be a rare earth element such as La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, and Er, as a person of ordinary skill has good reason to pursue the known options within his/her technical grasp.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

CI

/David P. Porta/

Supervisory Patent Examiner, Art Unit 2884

Conferees:

David P. Porta

/D. P. P./

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Darren Schuberg, TQAS TC 2800

/DS/

**Claims Appendix**

1. A radiation detector made from a compound comprising: $Cd_xZn_{1-x}Te$, where $0 \leq x \leq 1$ ; an element from column III or column VII of the periodic table in a concentration about 10 to 10,000 atomic parts per billion; and a rare earth element selected from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu in a concentration about 10 to 10,000 atomic parts per billion.

2. A method of forming a radiation detector compound comprising:

(a) providing a mixture of Cd, Zn and Te;

(b) heating the mixture to a liquid state;

(c) adding to the liquid mixture a first dopant that adds shallow level donors (electrons) to the top of an energy band gap of said mixture when it is solidified;

(d) adding to the liquid mixture a second dopant that adds deep level donors and/or acceptors to the middle of said band gap of said mixture when it is solidified; and

(e) solidifying said mixture including said first and second dopants to form the compound.

3. The method of claim 2, wherein the first dopant is an element from column III or column VII of the periodic table.

4. The method of claim 3, wherein the first dopant is an element selected from the group consisting of B, Al, Ga, In, Tl, F, Cl, Br and I.

5. The method of claim 2, wherein a concentration of the first dopant in the compound is about 10 to 10,000 atomic parts per billion.

6. The method of claim 2, wherein the second dopant is an element selected from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

7. The method of claim 2, wherein a concentration of the second dopant in the compound is about 10 to 10,000 atomic parts per billion.